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AUTHOR Ryan, Ellen Bouchard; Ledger, George
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ABSTRACT

The extent to which individual differences in pictograph recall performance are related to reading readiness and other aspects of language and cognitive development is examined in this paper. In each of three studies kindergarten children were taught names and toy enactions for approximately 30 pictographs. The kindergarteners were then administered the Pictograph Sentence Memory Task, which required reading a series of 6- to 8-item pictograph sentences and recalling each sentence after a short (10- or 15-second) delay period. Performance measures for these tasks included the number and order of pictographs recalled, the number of articles ("the") and verb inflections (/s/) included in the recall attempts, the number of decoding errors (corrected by the experimenter) made in reading the pictograph sentences, and the use of separate and integrated toy enactions. Moreover, the number of errors made in initially learning the individual pictograph names and enactions was recorded. Additional measures such as word recognition, oral word blending, metareading, nonverbal reasoning, metamemory, and auditory rehearsal, were performed in each of the three studies. Results indicate that learning the names and enactions corresponding to a rather large set of vocabulary items and recalling the meanings of pictograph sentences are both related to traditional measures of readiness and linguistic/cognitive development. (Author/JA)

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Pictograph Learning and Pictograph Sentence Memory Among Kindergarteners

Ellen Bouchard Ryan and George Ledger

Department of Psychology

University of Notre Dame

Notre Dame, Indiana

Running head: Semantic Integration Training

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Pictograph Learning and Pictograph Sentence Memory Among Kindergarteners

Since reading for meaning must be a part of learning to read, a measure of comprehension aptitude might profitably be added to traditional reading readiness batteries. Although listening comprehension is useful for this purpose, the increased metalinguistic requirements of the reading situation (see Gleitman & Rozin, 1977; Mattingly, 1977; Ryan, 1980; Vygotsky, 1962) may reduce the strength of the expected relationship between the two types of comprehension. Hence, it is worthwhile to seek a reading-like task in which prereaders can exhibit their spontaneous tendencies to treat sequences of written symbols as isolated units or to integrate them into a meaningful whole.

One promising approach to the study of semantic integration abilities in young children involves the use of meaningful sequences of visual word symbols. Numerous studies (Denner, 1970; Farnham-Diggory, 1967; Ferguson, 1975; Keeton, 1977) have shown that most children aged five and over can comprehend that pictographs (line drawings that are at least somewhat related to their word referents) are representative symbols. Yet, many preschool and school-age children who have successfully learned the meanings of the individual word symbols do not spontaneously integrate a sequence of them into a meaningful whole.

In order to assess prereaders' skills with written materials, we have developed a pictograph sentence reading and recall task. Pictographs are employed rather than logographs to minimize the effects of word-symbol learning in the sentence task. Children are taught names and toy enactions for each of approximately 30 individual pictographs. Subsequently, they are presented with a series of 10 pictograph sequences (see Figure 1). They are asked to name each

pictograph card in the sequence from left to right. The pictograph cards are removed from sight after the last one is named, and oral recall is requested 10 sec later. The children are instructed to do anything they wish to help themselves remember the pictographs, and appropriate toys for acting out the sentence meaning are available. In this report, we describe some correlational evidence supporting the claim that this task is a valuable index of reading readiness.

The Pictograph Sentence Memory Task, which contains ten sequences, was designed so that concurrent measures of strategy use would be available. First, any enactions with toys were scored. It should be noted that enactions (especially the integrated enaction of the sentence meaning) can be viewed as strategic in this task since the deep semantic processing involved yields enhanced recall. Second, the article "the" was not included in the pictograph sentences (e.g., "little", "cat", "walk", "around", "green", "block"), so that semantic integration could be assessed in terms of appropriate insertions of articles and verb inflection into the oral recall (e.g., "THE little cat walkS around THE green block.").

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Insert Figure 1 about here

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Thus, a sentence orientation to the pictograph sequences can be assessed in terms of two types of observable processing activities as well as inferred from the quality of the recall for the pictograph sequences.

Three studies have been conducted in which pictograph names and enactions were taught to kindergarteners, and the pictograph sentence memory task administered. The extent to which individual differences in pictograph recall performance were related to reading readiness and other aspects of language and cognitive development is examined here.

Elsewhere, we have described the procedures and materials in detail and have reported the findings from these studies concerning the effects of semantic integration training (Ledger & Ryan, in press; Ryan & Ledger, in press; Ryan, Ledger & Robine, 1980; Ledger & Ryan, Note 1).

In all these studies, the children were taught the names and simple actions for approximately 30 pictographs to a high criterion of performance. They were then administered the Pictograph Sentence Memory Task which required that they read a series of 6- to 8-item pictograph sentences and recall each sentence after a short (10 or 15 sec) delay period. Performance measures for these tasks included: the number and order of pictographs recalled, the number of articles ("the") and verb inflections (/s/) included in the recall attempts, the number of decoding errors (corrected by the experimenter) made in reading the pictograph sentences, and the use of separate and integrated toy enactions. Moreover, the number of errors made in initially learning the individual pictograph names and enactions were recorded.

Pearson product-moment correlations between background measures and pictograph performance are presented for the three studies separately in Tables 1, 2, and 3. Spontaneous use of toy enactions, despite the initial enaction instruction, were essentially nonexistent in all of the studies. Decoding errors, which were corrected by the experimenter, did occur while the children read the pictograph sequences. However, correlations between recall and decoding errors tended not to be significant in any of the studies.

In Study I, the only additional measures obtained from the 60 kindergarten children were Gates-MacGinitie word recognition and a test of oral word blending (requiring synthesis of both syllables and phonemes). Standard scores for these two measures were combined to

provide an overall reading readiness measure. As can be seen in Table 1, the number of errors made while initially learning to criterion the separate pictographs (especially the corresponding toy enactions) relate to reading readiness measures and Pictograph Sentence Memory, a finding that was confirmed across all the studies reported here. Analyses of the naming and enaction errors made by the children showed that the majority of errors occurred in the learning of the verb and preposition pictographs. These relational pictographs, which lack a concrete referent, are not only represented by more abstract pictographs but also determine the integrated meaning of the sequences to a greater extent than the more concrete noun and adjective pictographs. There is evidence, then, that the ability to learn these more abstract pictographs is significantly related to reading readiness, even though these traditional reading readiness measures are primarily decoding-based.

The relation of Pictograph Sentence Memory to traditional measures of reading readiness suggests that this task may offer indeed predict effectiveness of learning to read, but additional sentence-type measures are needed to access whether the Pictograph Sentence Memory task would also serve as an important complement to the traditional reading readiness assessments. In addition, the ability to learn pictograph symbols and their corresponding enactions has been shown to be related to the reading readiness measure and recall performance on the Pictograph Sentence Memory task.

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Insert Table 1 about here

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In Study II, the 30 kindergarten subjects performed a variety of reading readiness tasks: word recognition, oral word blending, writing their own name, and a metareading interview adapted from Reid (1966)

concerning their awareness of the features and functions of reading. The children also performed several oral language tasks: word blending, sentence cloze, and listening comprehension as well as several measures of cognitive development: nonverbal reasoning (Raven, 1962) and metamemory (Kreutzer, Leonard & Flavell, 1975). In this study, standard scores were combined to form three composite measures. The reading readiness measure was composed of Gates-MacGinitie word recognition, oral word blending and how well the child wrote his own name. The sentence processing measure was composed of oral cloze and listening comprehension performance, while the metacognition measure was composed of metamemory and metareading scores. The relationship between the pictograph sentence task and the listening comprehension and sentence cloze tasks in Study II suggests that performance on the pictograph task is indeed related to the degree to which children tend to view the pictograph sequence as an integrated, meaningful whole. This is supported by the highly significant correlation between the use of sentence insertions and recall performance on the Pictograph Sentence Memory task. According to Flavell (1977) and Downing (1979), knowledge of memory strategies and of the functions and features of reading ought to be related to reading readiness. This was confirmed by the negative correlation between the metacognition measure and the number of errors made in initially learning the pictograph names and enactions and by the positive correlations between metacognition and Pictograph Sentence Memory performance. In addition, the link between strategic behavior and cognitive level was demonstrated by the significant correlations of the sentence insertion strategy with reading readiness, sentence processing performance, and nonverbal reasoning and by the marginal correlation with the metacognition measure.

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Insert Table 2 about here

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In Study III, the tasks administered to the 52 kindergarten participants included the Pictograph Sentence Memory task, nonverbal reasoning, word recognition, metareading, awareness of literacy functions (Downing, 1979), and metamemory. Two additional measures of spontaneous strategy use were included in this study: looking at the toys and auditory rehearsal. As in the previous studies, significant negative correlations were found between reading readiness measures and the number of errors the children made in initially learning the pictograph names and enactions. As well, in keeping with the findings of Study II, a significant negative correlation was found between the metacognition measure and initial enaction errors. Pictograph Sentence Memory was found to correlate significantly with reading readiness, metacognition, nonverbal reasoning, and the use of strategies on the task. In addition, the use of strategies on this task was related to both the metacognition and nonverbal reasoning measures. Although significant negative correlations occurred in Study III between decoding errors made in reading the pictograph sequences and pictograph sentence memory, intercorrelations among the other measures were not affected at all by partialling out the variability due to decoding errors.

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Insert Table 3 about here

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These findings indicate that learning the names and enactions corresponding to a rather large set of vocabulary items and recalling the meanings of pictograph sentences relate to traditional measures of

reading readiness and linguistic/cognitive development. Moreover, other aspects of this research have indicated that recall for pictograph sentences becomes even more related to these individual difference measures after practice or minimal instructions regarding strategy use. The relationship found between metacognitive measures and both performance and strategy use on the Pictograph Sentence Memory task supports the conceptualization of the reading process that stresses the importance of higher-order strategic comprehension processes. These processes, which are influenced by metacognitive knowledge about memory and the features and functions of the reading process, have been shown to be significantly related to an active and strategic orientation toward this reading-related task.

The Pictograph Sentence Memory task provides a context in which the comprehension processes of young children can be measured before formal reading instruction has begun. The Pictograph Sentence Memory task also provides for the measurement of several types of strategic behaviors. The task is designed such that direct measures of the spontaneous emergence of strategic behavior are available through the monitoring of the child's use of sentence insertions, integrated enactions, auditory rehearsal and looking at the toys. The Addition in the final study of the latter two strategy indices was an important development. Indeed, further analyses of these data revealed a relationship between looking at toys and auditory rehearsal which suggests that children may indeed be using the toys as a support for their auditory rehearsal of the sequences. Even though enactions with the toys did not occur spontaneously in the children's first performance of the task, observations of such enactions and coding their degree of integration are useful after the children have received strategy instructions and even when the children have been given some practice with the task. Further research examining the

predictive power of pictograph performance for later reading achievement would be valuable.

From an applied point of view, pictograph sentence tasks ought to provide useful contexts in which non-decoding aspects of the reading process can be effectively taught to very young children. In addition, these rebus materials may provide a context for the teaching of reading to those who have difficulty mastering the decoding of traditional orthographic symbols. Thus, retarded or learning disabled children and adults might learn to read rebus materials quite readily since these materials rely on decoding aspects to a much lesser extent than alphabetic systems. Rebus-oriented reading programs might also be of use in remedial reading programs in that they minimize decoding aspects of the reading situation while they emphasize the active search for meaning that many poor readers lack. Here we have demonstrated that individual differences in pictograph sentence memory are related to sentence processing skills and awareness of the features and functions of reading and of memory. The instructional value of teaching these aspects of real reading through the use of simple pictograph materials promises to be substantial (Woodcock, 1967).

References

Denner, B. Representational and syntactic competence of problem readers. Child Development, 1970, 41, 881-887.

Downing, J. Reading as reasoning. New York: Springer-Verlag, 1979.

Farnham-Diggory, S. Symbol and synthesis in experimental reading. Child Development, 1967, 38, 223-231.

Ferguson, N. Pictographs and prereading skills. Child Development, 1975, 46, 786-789.

Flavell, J. Cognitive development. Englewood Cliffs, N. J.: Prentice-Hall, 1977.

Gleitman, L. R. and Rozin, P. The structure and acquisition of reading 1: Relations between orthographies and structure of language. In A. S. Reber and D. L. Scarborough (Eds.), Toward a Psychology of Reading. Hillsdale, N. J.: Lawrence Erlbaum Associates, 1977.

Keeton, A. Children's cognitive integration and memory processes for comprehending written sentences. Journal of Experimental Child Psychology, 1977, 23, 459-471.

Kreutzer, M. A., Leonard, C., & Flavell, J. H. An interview study of children's knowledge about memory. Monograph of the Society for Research in Child Development, 1975, 40, (1, Serial No. 159).

Ledger, G. W. & Ryan, E. B. The effects of semantic integration training on recall of pictograph sentences. Journal of Experimental Child Psychology, in press.

Ledger, G. W. & Ryan, E. B. Semantic integration of pictograph sentences: Effects of enaction, imagery and sentence repetition training on memory performance in kindergarten prereaders. University of Notre Dame, unpublished ms.

Mattingly, I. G. Reading, the linguistic process, and linguistic awareness. In J. F. Kavanaugh & I. G. Mattingly (Eds.), Language by ear and by eye. Cambridge, Mass.: M.I.T. Press, 1972.

Raven, J. C. Coloured progressive matrices. London: Lewis & Co., 1962.

Reid, J. F. Learning to think about reading. Educational Research, 1966, 9, 56-62.

Ryan, E. B. Metalinguistic development and reading. In L. H. Waterhouse, K. M. Fischer, and E. B. Ryan, Language Awareness and Reading. Newark, Del: International Reading Association, 1980a.

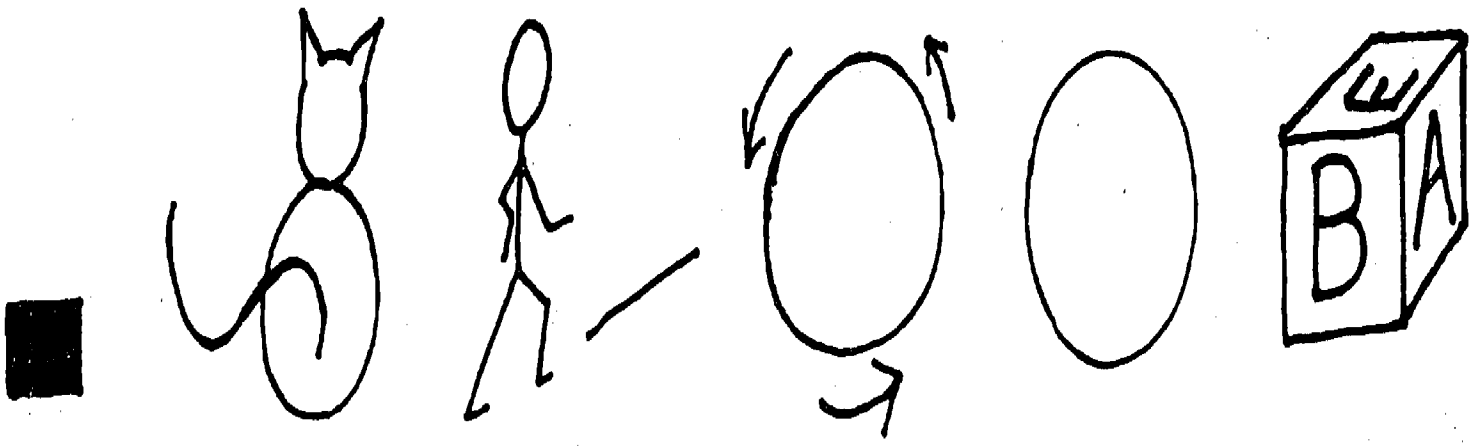
Ryan, E. B. & Ledger, G. W. Assessing sentence processing skills in prereaders. In B. A. Hutson (Ed.), Advances in Reading/Language Research, Vol 1. Greenwich, Conn: J.A.I. Press, in press.

Ryan, E. B., Ledger, G. W. & Robine, D. M. Effects of semantic integration training on the recall of pictograph sentences by kindergarten and first-grade children. Paper presented to the Annual Meeting of the American Psychological Association, Montreal, 1980.

Vygotsky. L. S. Thought and language. Cambridge, Mass.: M.I.T. Press, 1962.

Woodcock, M. The peabody rebus reading program. Circle Pines, Minn: American Guidance Service, Inc., 1967.

Figure 1



(The) little cat walks around (the) green block.

Table 1

Pearson Correlations Among Reading Readiness Measures,

Pictograph Learning, and Pictograph Sentence Memory

(Study I, N=60 Kindergarteners)

	Pictograph Learning		Pictograph Sentence Memory
Background Measures			
	Naming Errors	Enaction Errors	
Reading Readiness (Gates-MacGinitie Word Recognition and Word Blending)	-.23*	-.38**	.30**
Pictograph Learning			
Naming Errors		.36**	-.13
Enaction Errors			-.25*

*p < .05
**p < .01
***p < .001

Table 2

Pearson Correlations Among Reading Readiness, Sentence Processing, Metacognitive, Nonverbal Reasoning Background Measures and Pictograph Learning and Sentence Memory (Study II, N=30 Kindergarteners)

Background Measures	Pictograph Learning		Pictograph Sentence Memory	
	Naming Errors	Enaction Errors	Sentence Insertions	Recall
Reading Readiness (Gates-MacGinitie, Writing own name, Word Blending)	-.25	-.20	.31*	.49**
Sentence Processing (Oral Cloze and Listening comprehension)	-.30+	-.19	.31*	.52**
Metacognition (Metamemory & Metareading)	-.22	-.35*	.25	.29+
Nonverbal Reasoning	-.04	-.05	.32*	.14
Pictograph Sentence Memory				
Sentence Insertions				.52**

+p < .06
*p < .05
**p < .01
***p < .001

Table 3

Pearson Correlations Among Reading Readiness, Metacognition, Strategy Use and Pictograph Learning, and Pictograph Sentence Memory (Study III, N=52 Kindergarteners)

	Pictograph Learning		Pictograph Sentence Memory	
	Naming Errors	Enaction Errors	Strategy Use	Recall
Reading Readiness (Gates-MacGinitie Word Recognition)	-.43***	-.39**	.20	.42***
Metacognition (Metareading, Literacy Functions and Metamemory)	-.09	-.26*	.31**	.26*
Nonverbal Reasoning	-.15	-.16	.23*	.48***
Pictograph Sentence Memory				
Strategy Use	-.03	-.10		.28*

*p < .05
**p < .01
***p < .001